Increasing the Bioscience Capacity Through STEM Partnerships and Authentic Learning Experiences

The Future of Workforce Development OSU/CHS with TCC: June 22, 2013

Ken Miller, PhD
OSU/CHS Professor and Chair, Anatomy and Cell Biology
KEMMX CEO

Diana Spencer, PhD
TCC Biotechnology Coordinator
TCC CCURI Project Director
INBRE CC Coordinator
The Data and the Challenge...

### BIO2010: Transforming Undergraduate Education for Future Research Biologists
National Research Council (2003)

### Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future

### Vision and Change in Undergraduate Biology Education: A Call to Action
AAAS and NSF (2009)

### Undergraduate Research at Community Colleges
Council of Undergrad Research (2009)

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**The STEM Student Partnership Hub**

**Empowering a Culture of Scientists, Technologists, Mathematicians, Engineers, and Entrepreneurs in Oklahoma**
Creating Infrastructure to Support Feeding, Fueling, Healing and Cleaning the World

- Research and Presentation Opportunities
- Outreach to Community / Secondary Faculty and Students
- Rigorous Program Development
Creating Infrastructure to Support Feeding, Fueling, Healing and Cleaning the World

Research and Presentation Opportunities

Outreach to Community / Secondary Faculty and Students

Rigorous Program Development
Introduction to Biotechnology
Biotechnology Laboratory Methods and Techniques
Cell Culture
Molecular Biology and Techniques
Proteomics and Quality Control
Creating Infrastructure to Support Feeding, Fueling, Healing and Cleaning the World

- Research and Presentation Opportunities
- Outreach to Community / Secondary Faculty and Students
- Rigorous Program Development
Data to confirm 7500 student activities each year
The Oklahoma IDeA Network of Biomedical Research Excellence (OK-INBRE) is funded through the National Center for Research Resources (NCRR), a component of the National Institutes of Health (NIH) ($0.5M). This grant provided outreach workshops and science equipment to area high school teachers.
Tulsa Community College

Biotechnology
Learning Extravaganza 2012
Creating Infrastructure to Support Feeding, Fueling, Healing and Cleaning the World

Research and Presentation Opportunities

Outreach to Community / Secondary Faculty and Students

Rigorous Program Development
### Five Options for Authentic Research

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| Curricular Undergraduate Research Experiences (CURE) | • Conservation Biology  
• Cell Culture  
• Molecular Biology and Techniques |
| Summer Undergraduate Research Experiences (SURE)   | • Lab Sprints  
• Lab Sprints Plus |
| Tulsa Area Bioscience and Researchers Consortium (TABERC) Internships | • 9 institutions  
• Technical High to OU and OSU Medical |
| Biotechnology Apprenticeship Course with OSU/CHS    |                                                                         |
| Oklahoma INBRE Summer Research Internships         |                                                                         |
biodiscipline education, training, research and innovation by utilizing assets of all area institutions of higher education.

TABERC is currently comprised of nine Tulsa area institutes of higher education. The TABERC executive board includes at least one faculty member from each of the institutional partners. At our core, we are an educational provider and our institutional partners seek to merge local resources in order to build a sustainable biotech research and education movement in Tulsa.
development, and inter-institutional research articulations.
26 Graduates with AS/ Certificate

- BS or Grad
- Medical School
- Working in Field

22

7 in Grad School
- OSU
- NSU
- OU/HSC
- OSU/CHS

TCC Biotech
- 25% of OSU NSF SSTEM Recipients
- Of Grads by Fall 2010, 5 of 9 in grad school
Factors for Success:
Relationships
Support
Tours
Symposia/Seminars
Hires
Reciprocal Instruction
Internships
Referrals
Articulations
Collaboration
Tours
Symposia/Seminars

- Monthly Seminar Series, televised
- Annual High School Extravaganza
- Into a Molecular Future: Tulsa’s Growth Opportunities in the New Sciences of Life-Bio-Nano

Dr. Robert W. Allen, OSU-CHS

Forensic DNA analysis; where we have been and where we are going.

Robert W. Allen, PhD
Director, School of Forensic Sciences
Oklahoma State University, Center for Health Sciences
Tulsa, OK
Reciprocal Instruction

Heith Crosby

Miller lab, October 2010
Reciprocal Instruction

Dusti Sloan, Assistant Professor of Biology, Teaching Cell Culture techniques. Dusti Sloan is currently a Ph.D. student in Biomedical Sciences at OSU-CHS.
Reciprocal Instruction

Heith Crobsy, PharmD., Ph.D. candidate, helping teach Molecular Techniques Class.
Internships

This Spring 2013:
This Biotech Student completed an internship at OSU Center for Health Sciences. She has also participated in two poster presentations at the Oklahoma Research Day. This student has earned an AS and a Certificate.
Referrals

Donita Gray

OH! DNA EASE
Oklahoma High School Students
with DNA Extraction,
Amplification,
Sequencing and Exploration
July 2011
Collaborations

TCC SE Biotechnology Class

Peripheral Pain Mechanisms: The Role of Glutamate

Kenneth E. Miller, PhD

Professor & Chair; Anatomy & Cell Biology
Oklahoma State University Center For Health Sciences
Tulsa, OK

Kemmx Corporation, Sapulpa, OK

March 2013
None of this work is possible without the continued, organized, competent, optimistic, and passionate help from colleagues, staff, grant specialists, administration and neighboring institution researchers.

THANKS!